Ethiopian TVET-System

Furniture Making L-II

Based on Sept. 2012G.C. Occupational standard

Module Title: Applying sheet laminate by hand

TTLM Code: IND FMK2 TTLM 0919v1

This module includes the following Learning Guides

LG15: Prepare for work

LG Code: IND FMKII M05 LO1-LG15

LG16:Layout and prepare materials

LG Code: IND FMKII M05 LO2-LG16

LG17:Apply and/or fit and finish

LG Code: IND FMKII M05 LO3-LG17

LG18:Finalize operation and clean up

LG Code: IND FMKII M05 LO4-LG18

Instruction Sheet	LG15: Prepare for work

This learning guide is developed to provide you the necessary information regarding the following content coverage and topic -

- Safe handling requirements for equipment, products and materials
- Determining procedures for checking quality process
- Observing workplace health & safety requirements

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Determine job requirements, including; process, materials, finish and quantity.
- Checking quality at each stage of the process.
- Observing workplace health and safety requirements, including personal protection needs

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the **information** "Sheet 1, Sheet 2, and Sheet 3.
4. Accomplish the "Self-check 1, Self-check 2, Self-check 3 and Self-check 4" **in page -6, 8, and 11**respectively.

Information Sheet-1	Safe handling requirements for equipment, products and materials

1. **Introduction**

Apply sheet laminating by hand:

- Is an activity directed to the conversion of the products of nature (raw materials) in to the finished articles of use to mankind. The productive activity of any wood working enterprise (factory), therefore, consists in laminating of different kinds of production processes, which enable them to manufacture their respective basic products. Depending on the source (origin) of their raw materials, wood working industries are classified as primary.
- Laminating is a process of gluing things together. When laminating wood, the process typically refers to plastics or other materials laminated to plywood, solid wood or composites. Wood-laminate terminology often refers to flooring, but the process of laminating also includes veneer laminating and laminating solid wood together to make furniture.
- Wood laminating is the process of forming multiple sheets of veneer, chips or solid timber using mold's and bonded together by very strong adhesives, to produce rigid, lightweight structures. Solid wood bending is a cold press process generally limited to a single axis.

Laminate materials

❖ Laminate materials include
- Paper sheet,
- Veneer,
- Formica and
- plywood, chipwood, MDF,LDF,HDF

Laminating tools

Hand tool

- Tape Measure
- Hammer
- marking Knife
- Safety Glasses(goggle)
- Dust Mask
- Saw (optional tools)

OPTIONALand power tool

Router
Drill
Saws
Table Saw
Miter Saw
Circular Saw

Hand Saw
Jigsaw
Dividers
Chalk Line
Vinegar
Pocket Plane

1.1. Safe handling requirements for equipment, products and materials

The efficient handling and storing of materials are vital to industry. In addition to raw materials, these operations provide a continuous flow of parts and assemblies through the workplace and ensure that materials

are available when needed. Unfortunately, the improper handling and storing of materials often result in costly injuries.

When moving materials manually, workers should attach handles or holders to loads. In addition, workers should always wear appropriate personal protective equipment and use proper lifting techniques. To prevent injury from oversize loads, workers should seek help in the following:

- When a load is so bulky that employees cannot properly grasp or lift it,
- When employees cannot see around or over a load, or
- When employees cannot safely handle a load.

Using the following personal protective equipment prevents needless injuries when manually moving materials:

- Hand and forearm protection, such as gloves, for loads with sharp or rough edges.
- Eye protection.
- Steel-toed safety shoes or boots.
- Metal, fiber, or plastic metatarsal guards to protect the instep area from impact or compression.

What precautions must workers take to avoid storage hazards?

- To prevent creating hazards when storing materials, employers must do the following:

- Keep storage areas free from accumulated materials that cause tripping, fires, or explosions, or that may contribute to the harboring of rats and other pests;
- Place stored materials inside buildings that are under construction and at least 6 feet from hoist ways, or inside floor openings and at least 10 feet away from exterior walls;
- Separate non compatible material; and
- Equip employees who work on stored grain in silos, hoppers, or tanks, with lifelines and safety belts

RECOMMENDED AREA FOR LAMINATED PRODUCTS

The table below has to be used as a general guideline. You can choose laminate of various finishes, Design and colors anywhere in your home to give your furniture a great look.

Types of Laminate	Preferred areas

Matt Finish Laminate	Corporate and Business offices, Living Room , Bedroom etc. for subtle and stylish look
Glossy Finish Laminate	Clubs, event Industry, Showrooms, Kitchen etc. It gives glossy effect to furniture and it's also very easy to clean.
Metallic Finish Laminate	Commercials and showrooms
Textured Finish Laminate	Living Room , Decorative Units, Corporate , Business offices etc. for subtle and classy look
Solid Color Laminate	Kitchen Counter taps, Bathroom Areas, Bedroom etc.
Unicorn Laminate	Kitchen, Bedroom, Commercials and water prone areas etc. as it have a single core they are good water restive.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is wood laminating? (2pts)
2. Write materials and tools to perform laminating activities? (5pts)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Information Sheet #2	Determining procedures for checking quality process

2.1. Determining procedures for checking quality process

Quality control (QC) is a procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer.

Quality Check conducted on Laminate Sheets:

Sheet laminate and the materials used for the substrate are fairly expensive. The process of cutting and applying the sheet to a substrate is also fairly labor intensive. This expense means that special care needs to be taken at every point in the manufacture of laminated products.

Quality Checks are carried out on Laminate Sheets and the results have to conform to globally acceptable values. In the Indian context, they have to be conform in accordance with IS 2046 for High Pressure Decorative Laminates (also called HPDL). The guidelines check the **hardiness, resistance to scratches and dust, adverse climatic conditions and related environmental factors, and also to determine their quality in regard with appearance and stability.**

List of Quality Checks: Testing Laminate Resistance to –

1. Physical scratches
2. Surface wear and tear
3. Immersion in boiling water (Laminates swell up on immersion into water. The increase in thickness &weight, and also the change in appearance, discoloration etc. are noted)
4. Fire and heat burns
5. Steam and moisture
6. Staining by chemical agents
7. Heavy duty Scratching
8. Determine the limit of pressure that can be borne
9. Bleaching and discolorations (on exposure to Xenon arc lights and Carbon arc lights)
10. Sudden impact (the laminate sheet is shot at with a small diameter ball)
11. High temperature (The laminate sheets are dry heated to 180 degree centigrade)

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is quality control? (3pts)
2. Write the lists to check the quality of laminates?(5pts)

Note: **Satisfactory rating - 5 and 6 points** **Unsatisfactory - below 5 and 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Information Sheet #3	Observing workplace health & safety requirements

3.1. Observing workplace health & safety requirements

Workspace (area)

Sufficient clear space needs to be allocated to ensure employees have the full range of movement required to do the job and can move without injury.

The space allocated for employees within a workplace needs to be appropriate to the work performed.

Work area: Workplace design and layout needs to enable workstations to be accommodated in the safest configuration. Workstations need to provide clear space for employees.

The clear space needs to be exclusive of desks, benches, machinery and any other fittings**.**

Temperature

Workplaces that are buildings need to be capable of maintaining a temperature range that is comfortable and suitable to the work.

The best temperature is the temperature that most people find comfortable. Optimum comfort for sedentary work is between 20°C and 26°C, depending on the time of the year and clothing worn.

- The means of maintaining a comfortable temperature will depend on the working environment and the weather, and could include any of the following:
  - Fans
    - Electric heating
  - Open windows
  - building insulation
  - The layout of workstations
  - Direct sunlight control
  - Controlling air flow and the source of draughts.

All heating and cooling facilities need to be serviced regularly and maintained in a safe condition.

- **Lighting:** The lighting in a workplace needs to allow employees and others to move about easily. It needs to allow them to carry out their work effectively, without adopting awkward postures or straining their eyes to see.
- **Floors** Employees who are required contact with concrete, masonry or steel floors.

3.2. Personal protective equipment

PPE is equipment that will protect the user against health or safety risks at work. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. It also includes respiratory protective equipment (RPE).

PPE Includes

Eye Protection: Use safety glasses, chemical goggles or face shield as appropriate,

Hand Protection: Use heat resistant leather gloves,

Protective Clothing: Use long sleeved apron (shop jacket) overalls, fastened at neck and wrists,

Foot wear: Wear chemically and hared sole impervious safety shoes/boots,

Ear protective: Use safety ear pull, for highly noise,

Noise protection: Use safety dust mask and dual cartage,

Self-Check -3	Written Test

Directions:Matching From column A to column B

Column A column B

__1, Workspace A, Sedentary work is between 20°C and 26°C
__2, Work area B, clear space needs to beexclusive of desks, benches, machinery
__3, Temperature C, carries without adopting awkward postures or straining their eyes to see
__4, Lighting E, made from concrete, masonry or steel
__5, Floors F, goggles or face shield
__6, Eye protection **G,** move without injury

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Instruction Sheet	LG16: Layout and prepare materials

This learning guide is developed to provide you the necessary information regarding the following content coverage and topic -

- Selecting and checking laminates for flaws
- Preparing laminates for laid out &application
- Selecting and preparing suitable joining processes

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- selecte and checke laminates for flaws following work instructions
- prepare laminates for application and laid out
- Select and prepare suitable joining processes

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information "Sheet 1, Sheet 2, and Sheet 3.
4. Accomplish the "Self-check 1, Self-check t 2, and Self-check 3"**in page -18, 28 and __**respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1, **in page -29.**

Information Sheet-1	Selecting and checking laminates for flaws

1.1. Selecting and checking laminates for flaws

Lamination: is the technique of manufacturing a material in multiple layers, so that the composite material achieves improved strength, stability, appearance or other properties from the use of differing materials. A laminate is usually permanently assembled by pressure, welding, or adhesives use of laminating.

Laminating construction has long been used in the western country for furniture parts for core of veneered panel and sport goods. The most expensive application of glue laminating construction has been European where laminating used to building of aero plan coat-hanger house church greenhouse gymnasium planet arum theatres warehouse etc. Wood laminating also suitable for diving boats wood roll picker sticks flooring boat and ship timber aircraft parts etc.

Laminates can be classified/ selected into various types based on the following:

1. Based on Manufacturing Process
2. Based on Usage
3. Based on Surface Finish
4. Based on Advanced Properties
5. Based on Built

❖ TYPES OF LAMINATES BASED MANUFACTURING PROCESS

1. Low Pressure Laminate- In low pressure laminate decorative paper is soaked in melamine resins and dried naturally and then it will bonded over MDF,HDF or Particle Board with heat activated glue and laminator having a heat rollers for consistent and fine bond.
2. High Pressure Laminate-High Pressure laminates are hard decorative sheets which fixed on plywood and MDF using Adhesive and pressed using cold process.

❖ TYPES OF LAMINATES BASED ON USAGE

1. Decorative Laminate –Decorative Laminates are mainly used for decorate and protect furniture. These laminates give premium finish, touch and feel. They can mainly use in conference rooms, Home interiors, walls etc. to give it attractive and auspicious look.

2. Industrial Laminate-Industrial Laminate has higher resistance against scratch and wear and tear. They are more durable to use in Industrial areas. They can mainly use in office cabinetries, office furniture's etc. Circuit boards are made using Industrial Laminates.

❖ TYPES OF LAMINATES BASED ON SURFACE FINISH

1. Matt Finish Laminate- It creates matt like effect on laminate surface. It mostly used in Corporate and business offices which gives subtle but stylish finish to the furniture.
2. Glossy finished Laminate- It creates glossy effect on laminate surface. Glossy finished laminates create print on it more eye catchy and attractive than matt finish. These types of laminates are used in clubs or event industry and they are also suitable to use in kitchen as it makes cleaning more easily.
3. Metallic finished Laminate- As name indicates it gives metallic look to furniture's. This laminates are more durable and glossy. These laminates are mainly used in commercials and showrooms.
4. Texture finished Laminate- In this type of laminate when you touch it you can feel texture of the laminate. These laminates create impressive impact on furniture. These type of laminates are used in corporate offices, commercials etc. in which they create subtle and classy look.
5. Solid Colored Laminates-this type of laminate have single solid color without any prints or textures on it. They are mainly used in kitchen counter tops and Bathroom areas.
6. Digital Laminates- Digital Laminates are actually the customized printed laminates for interior. This offers architects and designers an easy, simple and reliable mode of artistic expression.

❖ TYPES OF LAMINATES BASED ON ADVANCED PROPERTIES

1. Fire retardant Laminate-These are fire resistive laminate. It used in fire prone areas like kitchen, Industries etc.
2. Anti-Bacterial Laminate-These laminates are mainly used in hospitals as first priority is for hygiene. These laminates are bacterial resistant.
3. Electrostatic dissipative Laminate-These laminates are used in electronic assembly for manufacturing circuit board.
4. Magnetic Laminate-Magnetic Laminate, an innovative high pressure decorative laminates which has a unique property of holding magnet. These laminates can use in offices for holding reports, notice boards etc. In Hospital it can used for holding operation schedule, charts, reports etc. and in houses it can used in bedroom for holding photographs, Schedules, planning's etc.

5. Marker or chalk board Laminate-These laminates have non-porous Glossy White laminate surface which gives excellent properties for marker pens for writing, wiping and rewriting. These laminates have extra thickness with abrasive resistant property.

❖ **TYPES OF LAMINATES BASED ON BUILT**

1. Unicore Laminates- These laminates have attractive and edge lining laminate matching to surface facing. It creates neat and even look to the work piece. These laminate Avoids usage of un-matched plastic edge Bandar.
2. Noncore laminate-In these type of laminate edge of laminate is generally black i.e. wood. These laminates are economical than Unicore laminate.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Laminates can be classified/ selected into various types based on: (5pt)

a. _____
b. _____
c. _____
d. _____
e. _____

Note: **Satisfactory rating - 3 points Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

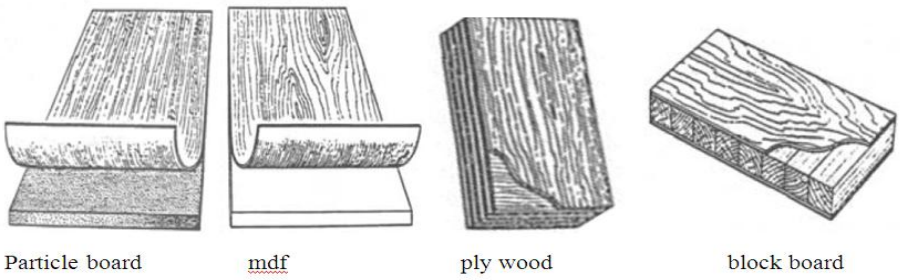
Name: _____ **Date:** _____

Information Sheet-2	Laminates preparations

2.1. **Preparing laminates for laid out &application**

Raw Materials for Lamination

1. Veneer
2. MDF
3. Ply wood
4. Chip wood
5. Formica



1. **Wood Veneers**

The veneers used in the lamination industry include real wood veneers that are rotary cut, flat cut, rift cut or quarter cut from a variety of wood species, both domestic and imported.

The veneers are sliced or peeled to a thickness between 1/25 to 1/50 inch (1.0 to 0.50 mm) and are available with a paper, providing varying degrees of flexibility.

Veneers can be overlaid either with heat- pressing resins or by cold -pressing.

The main resin used in hot-pressing systems is a urea-based adhesive, due to its ability to make the panel more rigid, its faster processing parameters and lower cost base.

Cold press systems typically use polyvinyl acetate, casein and contact adhesives.

Veneered composite panel constructions are used in many applications, including high quality furniture, case goods, store fixtures and cabinetry. Some veneers are used for profile wrapping, typically over MDF, for high-end millwork applications.

- **Veneer cutting methods**

The method used to cut veneers is an important factor in producing the various visual effects.

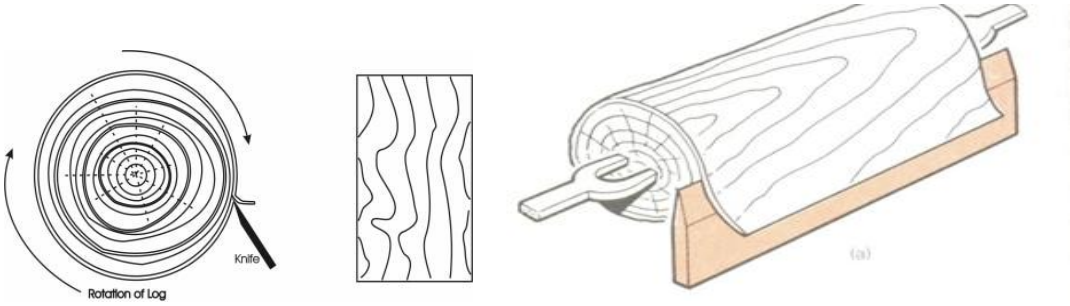
Generally, there are three major methods of the veneer cutting:

- **Rotary peeling,**
- **Slicing and**
- **Half-round slicing.**

These methods produce different grain patterns regardless of the wood species involved.

I. Rotary peeling

The log is mounted centrally in the lathe and turned always against a knife. The veneer is "unrolled' much like a decoration. Since the cut follows the log's annual growth rings, a bold variegated grain marking is produced. Rotary peeled veneer is very wide. The veneer is then clipped to width and objectionable defects are removed. This is the common procedure for manufacture of commercial veneers for construction-grade plywood from softwood species. This method is also used for producing veneer from some hardwood species.

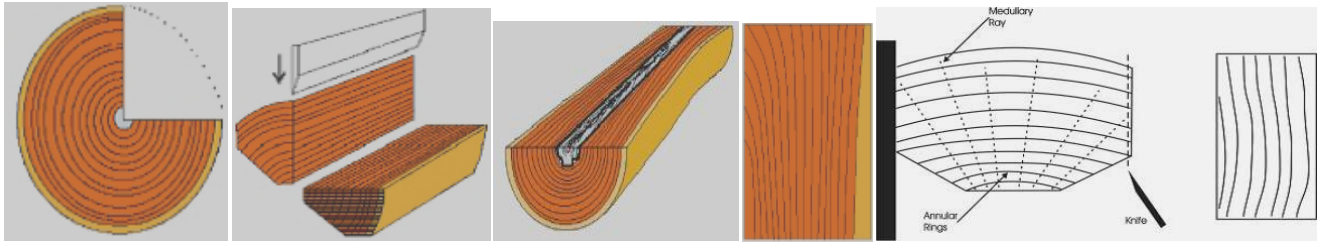


II. Slicing

Slicing is used to produce decorative veneers. There are various methods of veneer slicing such as **quarter cut, crown cut, half-round and rift cut**.

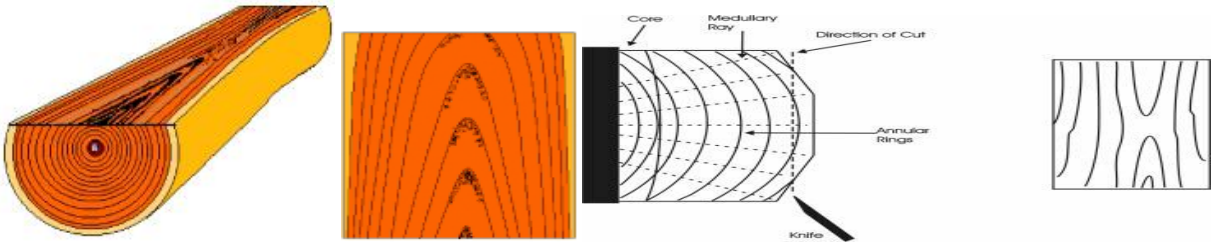
Quarter cut

The quarter log or flitch: is mounted on a metal frame so that the growth rings of the flitch strike the knife at approximately right angles, producing a series of stripes, straight in some timbers or varied in others. This cut requires the largest diameter logs, In this method, the average inclination of the growth rings to the wide surface is greater than 45 degrees.



Crown Cut or Flat Cut

The half log or flitch, is mounted on a metal frame with the heart side flat against the guideplate. The frame moves up and down against a knife in a straight plane parallel to a linethroughthe center of the flitch. Wide surface of the board is a tangential plane to the growth rings.



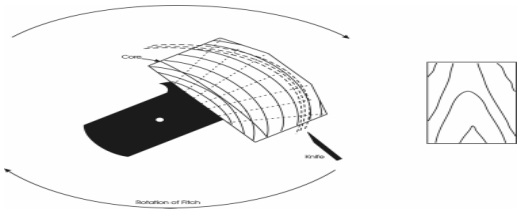
Half-Round Slicing

This method is a variation of rotary cutting. Segments or fitches of the log are mounted off centering the lathe and then rotated against a knife and a pressure bar. This results in the veneer being cut in a curved manner slightly across the annual growth rings.

The veneer visually shows modified characteristics of both rotary and flat sliced methods.

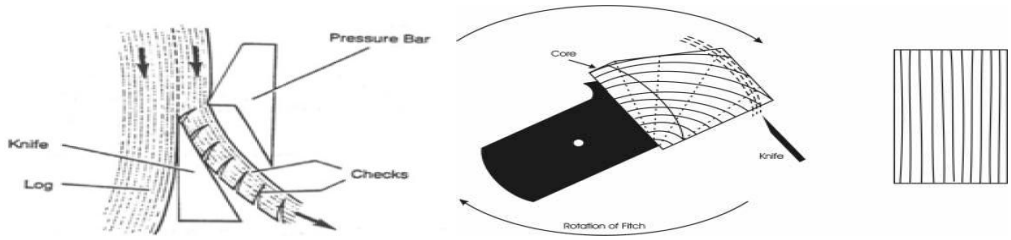
This method produces a wider sheet of veneer from a given size of log compared to a flat slicing method. As a result, smaller logs can be used for veneer production.

This technique is ideally suited for the production of veneer from plantation logs of a relatively young age and smaller diameters.



Rift-Cut Slicing

Rift cut veneer is produced in the various species of oak. Oak has medullar ray cells, whichRadiate from the center of the log like curved spokes of a wheel. The rift or comb grain effect is obtained by cutting at an angle of about 15 degrees off the quartered position to avoid the flake figure of the medullar rays.



Types of veneers

There are two types of veneers

A)Constructional veneers

B)Decorative veneers

A) Constructional veneers: are produced mainly for plywood and laminated veneer lumber (LVL). Plywood consists of an odd number of laminations of veneer bonded at right angles to each other to equalize shrinkage and improve engineering properties.

LVL is made up of parallel laminations of veneer, glued and processed to form material ofthickness similar to sawn timber.

B) Decorative veneers: are produced to display aesthetic surface application.

There are four major types of markets or uses for decorative veneers:

- Architectural
- Furniture and cabinets
- Profile-wrapped moldings
- Paneling

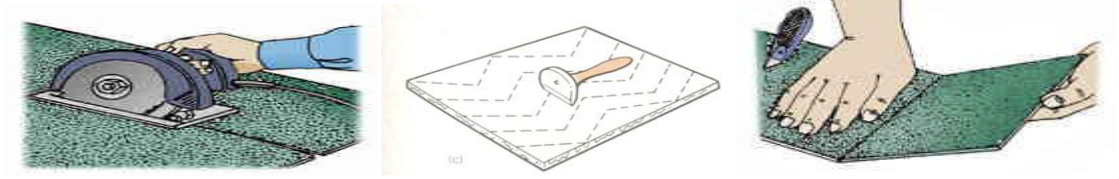
Making veneer project

2. Formica

Formica has long been used for furniture, cabinetry, wall boards and other solid surfaces that need to be constructed from hard-wearing, resilient material. It originally served as a substitute for the mineral mica, hence its name "for mica." Today, Formica is one of the most widely used surfacing materials in the world.

How to Cut a Formica Countertop

Formica provides a durable and heat-resistant material for use in the kitchen. The lightweight and thin profile of Formica allows an at-home installer to cut and shape the material easily. Cut a countertop that has already been installed with Formica laminate with a **circular saw** and **jigsaw** by the **fine blade and cutting by sharp hand chisel**. For new Formica installations, use specialized laminate cutters or a **saber saw** to cut,



Veneers tool

Veneer Saw

A veneer saw can be used, with the aid of a straightedge, to cut veneers of any thickness. It produces a square edge cut for accurate butt jointing of matched veneers and has a reversible double edge blade with fine teeth that have no set.

Veneer Saw

Glue Brushes

A clean, round brush (mop) is generally used to transfer the glue from the pot onto the work. The size of the brush is determined by the volume of glue required for the operation.

Knives

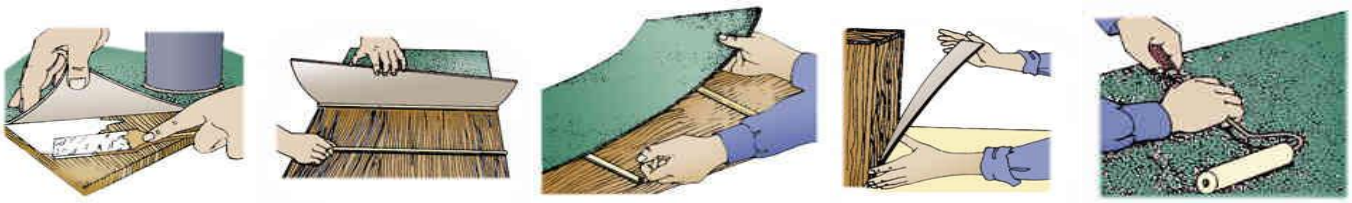
Use a surgical scalpel or craft knife fitted with a pointed blade for cutting intricate shapes, and a stiffer curved edge blade for cutting straight lines (particularly if extra pressure is required).

Veneer Hammers

A veneer hammer is used for hand laying veneers.

Installing procedure veneer & Formica Sheets

- Sand the surface of the counter to remove any residue and to make the surface smooth. Remove the dust by using a damp rag or a vacuum.
- Apply contact cement to the top of the counter with a paint brush. Make sure the contact cement is applied evenly over the entire surface.
- Place dowel rods on the counter surface about 12" apart. These will be used to position the plastic laminate before adhering it to the surface. Place the plastic laminate on top of the dowel rods and position it so that it is setting in the correct location over the counter.
- Pull out the dowel rods, one at a time, while bonding the plastic laminate to the counter surface.
- Press down on the plastic laminate to make sure all of it has adhered to the counter surface. You can also run a roller over the top of the plastic laminate.



3. Manufacturing board

Manufactured boards are timber sheets which are produced by gluing wood layers or wood fibers together. Manufactured boards often made use of waste wood materials. Manufactured boards have been developed mainly for industrial production as they can be made in very large sheets of consistent quality. Boards are available in many thicknesses.

4. Plywood

Plywood is made by gluing together a number of thin veneers or plies of softwood or hardwood.

Advantages: -There are always an odd number of veneers and each ply is at a right angle to the one below, this gives the material its strength. The more veneers used, the stronger the plywood becomes. Both the type of glue and veneers determine the suitability of a sheet for a particular application. The finish quality of plywood varies considerably, some plywood have attractive grains while others can contain knots. A plywood panel always contains an odd number of pieces, usually 3,5, 7, 9 and 12layers. Because of its construction, plywood resists shrinkage more than solid wood.

Part of plywood

Face: outer or as the name implies ply wood

Core: is the (central part) inner ply wood

Back: as the name implies the back of play wood.

The smoothness of the surface and the number of defects in it grade plywood.

Plywood can be nailed and screwed. Thin plywood is flexible and can be formed into curved shapes.

Sizes: -Plywood is sold in 2440 x 1220mm and 1525 x 1525mm sheets.

Classes of Plywood

Two classes of plywood are commonly available, covered by separate standards:

(a) Construction and industrial plywood and

(b) Hardwood and decorative plywood.

A. Construction and Industrial Plywood

The bulk of construction and industrial plywood is used where performance is more important than appearance. However, some grades of construction and industrial plywood are made with faces selected primarily for appearance and are used either with clear natural finishes or lightly pigmented finishes.

B. Hardwood And Decorative Plywood

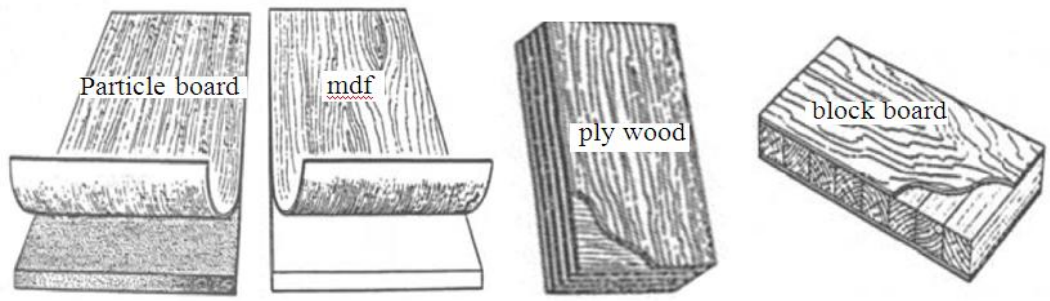
Hardwood plywood is normally used in applications including decorative wall panels and furniture and cabinet panels where appearance is more important than decorative.

Most of the production is intended for externally projected uses, although a very small proportion is made with adhesives suitable for exterior service, such as in nautical applications. A substantial portion of all hardwood plywood is available completely finished. Hardwood and decorative plywood is categorized by species and characteristics of face veneer, bond durability, and composition of center layers (veneer, lumber, particleboard, MDF, or hardboard,).

Ply wood laminate: made up of ply wood layers 3.5.7.9.and 12 pieces. Which is the most strength able for the other laminating (panel chip wood MDF).

5. **Chip wood**

Chip wood (particle board) is a sheet material made up of wood flakes, chips, sawdust, and planer shavings. These wood particles are mixed with an adhesive, formed in a mat, presses sheet form into.



Manufactured board types	Grain image	Board Uses	Example product
MDF - Smooth, even surface. Easily machined and painted or stained. Also available in water and fire resistant forms. A manufactured board.		Used mainly for furniture and interior paneling due to its easy machining qualities. Often veneered or painted.	
Plywood - A very strong board which is constructed of layers of veneer or piles which are glued at 90 degrees to each other. Interior and exterior grades are available. A manufactured board.		Used for strong structural paneling board used in building construction. Furniture making. Some grades used for boat building and exterior work.	
Chipboard - Made from chips of wood glued together. Usually veneered or covered in plastic laminate. A manufactured board.		Used for kitchen and bedroom furniture usually veneered or covered with a plastic laminated. Shelving and general DIY work.	
Block board - Similar to plywood but the central layer is made from strips of timber. Good for shelves and worktops.		Used where heavier structures are needed. Common for shelving and worktops.	
Hardboard - A very cheap particle board which sometimes has a laminated plastic surface. A manufactured board.		Used for furniture backs, covering curved structures, door panels.	

Bent wood lamination basics

-Cut on the straight-grained edge

-Cut the plies through a straight-grained edge rather than the face-grain side. Because the cuts are made parallel to the grain, a straight-grained board can be sliced and put back together with little interruption to the grain lines.

Line the form with cork

Apply a layer of self-stick cork liner (available at home centers, 12-in. x 4-ft. sheet, $6) to the form. This liner helps even out irregularities in the sawn form. Cork also creates a nonslip surface that aids in holding the lamination to the form as you apply clamping pressure.

Self-Check -2	Written Test

Direction: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List the raw materials for Lamination process? (3pts)
2. List and explain the main Parts of ply wood? (3pts)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Information Sheet -3	**Selecting and preparing suitable joining processes**

Joining laminate

Sheet laminates can be joined to create an almost seamless joint in the face of the sheets. This is done only for the convenience of transportation before fitting large tops on site, or where sheet size limitations do not permit cutting a single piece large enough for the job.

Operation Sheet 1	Laminate preparation

How do You Laminate a Bench top and Edge at your Workplace?

<u>The procedure below is a general guide to laminating a bench top and edge.</u>

1. Mark out and cut the bench top substrate to the correct size and shape, including any build-ups for edges.

2. If sinks, basins and hotplates are required, do the cut-outs for these at this point. This can prevent the possible chips and scratches that can occur if the laminate is applied first.

3. Glue and attach any build-ups.

4. Mark out the sheet laminate to the correct size and shape, including edge strips.

5. Cut the laminate to the required size using a laminate scoring knife or a panel saw. For any internal cut-outs, you must drill a hole in each corner to prevent the sheet from cracking during the cutting.

6. Apply the laminate edges: coat both surfaces (the laminate edge and the edge of the substrate) with a contact adhesive. If the substrate is a porous material (for instance, particleboard), apply a second coat of adhesive once the first coat has dried. Wait until the edges are touch-dry and then apply the laminate.

7. Trim the edges until they are flush, using a router, before sanding and fi ling the corners where necessary.

8. Before applying any adhesive to the bench top laminate and substrate, make sure both surfaces are clean.

9. Spray both the laminate and substrate with an even coating of contact adhesive.

10. Allow sufficient time for the adhesive to dry.

11. Place spacers, such as lengths of dowel, over the surface to allow you to position the laminate.

12. Remove the spacers with care to ensure the laminate can be accurately located.

13. Press the surfaces firmly together with a roller (hand or machine).

14. Trim off any waste laminate from around the bench top, including any sink, basin or hotplate cut-outs.

15. File all the edges smooth.

16. Use a solvent to clean all the laminate surfaces.

Instruction Sheet	**LG17: Apply and /or fit Laminating operations**

This learning guide is developed to provide you the necessary information regarding the following content coverage and topic -

- Measuring, marking and cutting to size
- Tools and equipment for laminating process
- Adhesives
- Completing final trim and finishing with specifications

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Laminates are measured, marked and cut to size and applied to the base materials.
- Procedures in applying adhesives
- Tools and equipment are used in accordance with workplace procedures, including use of personal protective equipment.
- Adhesives are applied according to workplace procedures and/or manufacturers' instructions.
- Complete final trim and finishing with specifications.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3 and Sheet 4".
4. Accomplish the "Self-check 1, Self-check t 2, Self-check 3 and Self-check 4" **in page -38, 41, and 44** respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1," **in page -48.**

Information Sheet-1	**Measuring, marking and cutting laminates**

1.1. Measuring, marking and cutting laminates

A **laminate table top** is hard wearing and practical for the kitchen. You can easily apply laminate to a table top giving it a new lease of life at a fraction of the cost of replacing the table.

Step 1 - Choose Your Laminate (material)

Laminate is available in sheets from most hardware stores. It is generally between 0.5 and 1.5 mm thick. You should also look out for the technical specifications on the manufacturer's guidelines that will show you how good the laminate's resistance to wear, scratching, staining and fire is. If your laminate is not self- adhesive, you will also require wood glue.

Step 2 - Prepare Your Table (Prepare material)

First you should prepare your table ready for laminating by sanding the top down with sandpaper. This will give the table a smooth surface ready for the laminate.

Once you have fully sanded down the surface down, remove the dust with a soft cloth or a vacuum cleaner with a soft brush attachment. If the table already has a laminated or veneered surface, you will need to remove this first with a chisel. Wedge the chisel underneath the veneer and ply the layer off a little at a time. Use protective goggles when you are doing this in case any splinters come off. You will be able to sand down any dried on glue that is left underneath.

Step 3 - Measuring Your Table

Before you cut the laminate, you need to measure the table top with a tape measure. You should then add an inch to each side of the table measurements when measuring and cutting out the laminate.

Step 4 - Measure and Cut the Laminate

You should then measure the laminate to your table measurements and carefully cut with a utility knife. Use a large rule to make sure you cut the sides in a straight line, cutting along the side of the rule with the knife. Take care not to scratch the new laminate.

Step 5 - Applying the Laminate

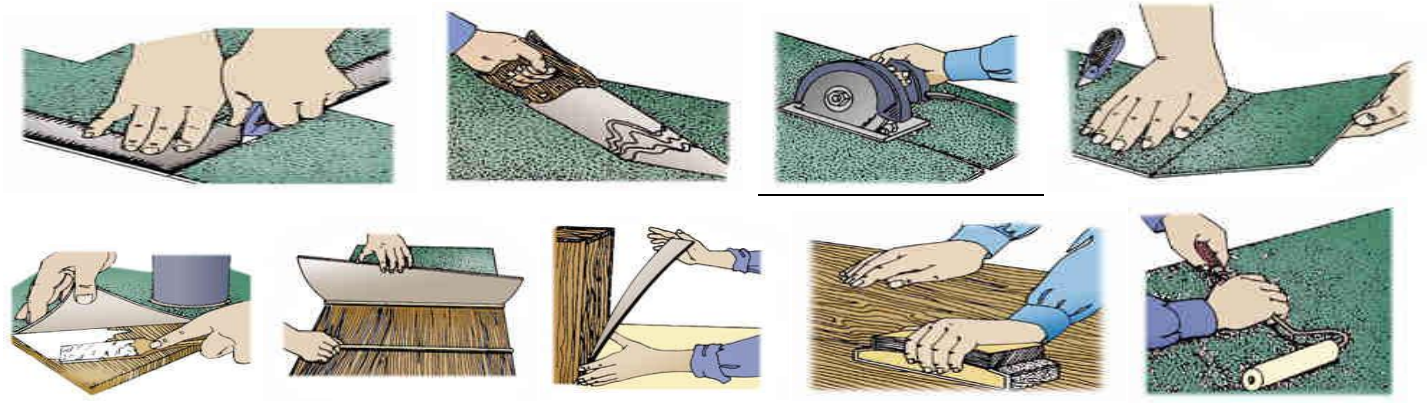
Remove the backing from the self -adhesive laminate and position the laminate so that each table edge has the extra inch of laminate hanging over it. If you are gluing your laminate, apply a thin layer of wood glue to the table before placing the laminate. Press the laminate firmly down onto the table top and push firmly over the laminate to secure it.

It is always a good idea to then cover the table with books or other heavy objects and leave it overnight so that the adhesive layer has a full chance to set.

Once you are satisfied that the laminate is fully secure you should now carefully cut around the table using some heavy duty scissors to remove the excess laminate from each of the table sides.

Step 6 - Finishing the Table

The last stage is to sand the edges of the table lightly so that there is an even finish all the way round.



How to cut laminates

Laminate is a durable material used for countertops and flooring. It's quite affordable and comes in many different finishes. Laminate is sold in sheets, which means it will have to be cut down to size in order to fit your installation needs. This does not have to be a job reserved only for professionals. Several different types of saws are appropriate for cutting laminate. However, some saws perform better than others when it comes to particular kinds of cuts. As long as you have the proper cutting tools and observe a few particular techniques, you can easily cut your own laminate for home improvement projects.

Method 1:-**Make Straight Cuts**

1. Use a circular **saw** or a handsaw with at least 18 teeth per inch to avoid chipping it.
2. Mark the line on the **laminate** flooring. ...
3. Leave the **laminate** facing right-side-up and **cut** it with a circular **saw** or handsaw.

Method 2:- Cut Curved Shapes

1. Choose a jigsaw with a standard blade or one with a laminate flooring jigsaw blade with fine teeth. The fine teeth will allow you to cut the laminate flooring face up without chipping it.
2. Make a paper pattern to help you make curved cuts and avoid wasting laminate flooring.
    - Hold a piece of paper around the pillar or pipes and trace around the objects.
    - Cut out the paper pattern, and then lay it back down to test for accuracy. This may take a few attempts to get the exact shape you want the laminate to be. Once you can successfully place the pattern around the obstacle, you're ready to draw the shape onto the laminate flooring.
3. **Cut out the curved shape.**
    a. With a standard jigsaw blade, flip the laminate plank upside down. Place the pattern on the backside of the laminate, making sure to flip the pattern, so your cut laminate is positioned to come out correctly when the plank is flipped face up. Hold the jigsaw vertical, so the blade runs smoothly from one edge of the laminate to the other.
    b. If cutting the laminate face up, place painter's tape on the laminate along the pattern to keep it from chipping. Mark the cut line on top of the tape and cut with a jigsaw with a special blade.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How to cut laminates? (5pt)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Information Sheet-2	**Tools and equipment's for laminating process**

1.1.Tools and equipment's for laminating process

With a laminate flooring installation, you'll need to have access to some power tools. Cutting the laminate will require a saw, especially if you have special edges and obstructions. We recommend purchasing a laminate installation kit to help with the install.

- Clamp
- Tape (packaging tape works fine)
- Safety Glasses or Goggles
- A Dust Mask
- Measuring Tape
- Carpenter's Square

- Utility Knife
- A Saw. This can be a miter saw, power saw with dust collector, circular saw with 60-tooth carbide tipped blade, a power jigsaw, a handsaw or a laminate specific cutter (will only cut straight edges).Hand Saw or Door Jam saw for the door jams.
- Hammer
- Broom & Dustpan
- Scissors

➢ **Clamp**

Clamp: are used to hold stock together while gluing pieces of wood together. In general, clamp is used to hold stock while we are working on it.

There are many kinds of clamps use to furniture making .these are

- Bar clamp.
- C/G-clamp
- Hand screw clamp.

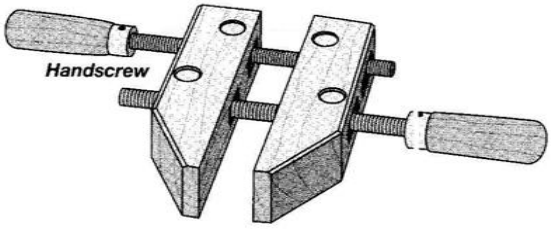
➢ **Always the clamp is holding after the gluing together.**

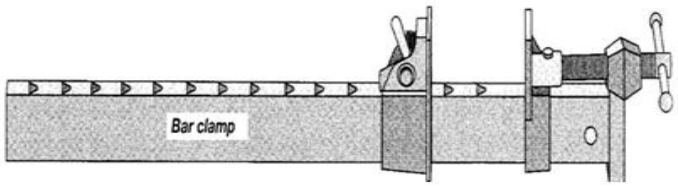
Bar clamp: is the most widely with various types of clamp. This is used to hold edge to edge joint (frame to frame) the size 38cm-300cm.

C/G-clamp/cramp: is used to small part face to face joint with deferent size, the size is from 1inche – 19inches (2.54 cm-48cm) longer,

Hand screw clamp: is varying in the size from those jaws 10cm long to those with 56cm long and drive by two hands.

Spring clamp
Typically used to secure thin stock or molding. Handles are squeezed to open the clamp; plastic tips on the jaws protect the stock. Available in several sizes with clamping capacities ranging from 1 inch to 4 inches.





Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part I - Choose the best answer (2pts each)

1. _____is used to hold stocks together while gluing pieces of wood together.

A. Cement B. Glue C. Bar clamp D. Clamp

2. _____ is the most widely with various types of clamp. This is used to hold edge to edge joint (frame to frame) the size 38cm-300cm.

A. Bar clamp B. C/G-clamp/cramp C. F clamp D. Cement

Part II- Give short answer

1.What are the tools and equipment's for laminating process? (5pts)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Information Sheet-3	**applying adhesives**

3.1. Adhesives:

Various adhesives can be used to stick the laminate to a substrate. It is important to take into consideration the following when selecting an adhesive.

• How much heat the surface will be exposed to; for example, the laminated surface may be exposed to direct sunlight, or be close to gas cooker-tops or gas heating points. Although advancements in adhesive technology are occurring all the time, some contact adhesives will soften and release their grip when exposed to these heat sources.

• How much dampness the substrate will be exposed to – moisture absorbed into the substrate can adversely affect the grip of the adhesive, as well as cause the substrate itself to deteriorate.

• What processes need to be undertaken; for example, post forming calls for special-purpose contact cement or even special-purpose PVA glue for the section of the laminate that is to be formed around the curve.

- **Glue adhesive and cement both are used to bonding together.**

- **Glue** is kind of adhesive made up of natural materials like animal and vegetables. It is more popular than they are to days, most have been replaced with adhesive and cement which has superior's quality.

The common gules are

- Hot animal glue
- Liquid Hyde glue
- Casein glue
- Blood albumin glue

- **Cement**: is use to rubber –suspended in liquid most type film able and non -film able mixture. Is divide in to two: contact cement and mastic

Contact cement; is used commonly to glue dawn veneer plastic lamination and other surface decoration,

- ✓ The cement is applied both surface of joint.
- ✓ The surface glue Contact cement is touch after both surface completely dried attached.

Mastic; is very thick and used construction to ply wood floor and other strong joints.

Adhesive also made up of synthetic materials

Adhesive: are the most popular bonding materials, which are two types of adhesive,

- Thermoplastic and
- thermoses

3.2. Applying adhesives according to workplace procedures

Before using any adhesive glue to attach two pieces of wood edge-to-edge;

- Place a line of masking tape down one side of the joint,
- Spanning the crack with the tape.
- Then flip the pieces of wood over and apply glue inside the joint.
- Secure the two pieces and use a cloth to wipe off any excess glue.

GLUE AND CLAMPS

Woodworkers often **laminate two or three pieces of lumber** together to get thicker pieces. The process involves wood glue and clamps. Recognize laminated furniture parts by a thin glue line along legs or when parts are thicker than 3/4 inch.

Construction lumber often refers to laminating timber, which is thicker, bigger and strong enough to support the roofs on large buildings. Laminated timbers are numerous pieces stacked together or labeled as LVL (laminated veneer lumber) or Glulam (glued laminated beam).

• If off-cuts are left on the floor, workers may tread on them and slip, which could result in injuries ranging from strains to the groin or back through to concussion from falls.

• The edges are very sharp and capable of cutting hands and other parts of the body

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is glue?(2pts)
2. Write two kinds of adhesives? (3pts)

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Information Sheet-4	Completing final trim and finishing with specifications

4.1. Completing final trim and finishing with specifications

When the laminated sheet is in the correct position, the paper or wood strips can be removed and the two cemented pieces bonded together. A roller can be used to apply pressure to the newly laid sheets of laminated plastic. Roll the entire surface thoroughly to eliminate any air pockets and to be sure the plastic sheet is firmly attached to the surface at all points.

Allow the edge trim to dry approximately 30 minutes. Then touch off the edges with a file which is set at a 45 degree angle to avoid any danger of chipping the laminate with the teeth of the file. When using metal strips for finish work, it may be necessary to use a router, to cut a groove for certain types of trim materials. Special bits are available for routing work of this type.

Any surplus contact cement should be removed with a special solvent. If such a solvent is not available, nail polish remover can be used.

How to Trim a Laminate Countertop

A **laminate trimmer** (or **trimming router**) is a small version of a wood router, normally used to trim laminate such as Formica. It generally has a 1/4-inch collet.

A. With a Laminate Trimmer

Step 1 – Trim the Laminate

If you have access to a laminate trimmer, you can simply and easily trim your laminate to the desired size. Simply roll the laminate trimmer over the edge of the countertop and the trimmer will create the perfect, smoothed cut for you.

B. Without a Laminate Trimmer

If you do not have a laminate trimmer, do not worry. You can still easily trim your laminate with other tools.

Step 1 – Setup Saw

For this project, it is best to use a blade on your circular saw that is designed for fine cuts that has a narrow kerf and carbide tips. Install this blade onto your circular saw.

Step 2 – Mark Cut Line

Using the pencil and measuring tape as a straight edge, you need to mark your cut line. Make certain your line is straight and dark enough on the laminate for you to see through tape.

Step 3 – Tape the Cut Line

Once your cut line is drawn, you need to apply masking tape directly over the cut line. The masking tape will protect the laminate and prevent chipping while you are cutting, so the side of the laminate you are

keeping is not damaged by the saw or other tools. Now, redraw your cut line on top of the tape so that you can clearly see it while cutting.

Step 4 – Cut the Laminate

Now you are ready to use the circular saw to cut the laminate. When cutting, move slowly and steadily across the laminate to keep your cut smooth and straight.

Step 5 – File the Edges

Next, you can file the edges of the laminate counter top using the metal file. You want to file slowly and just a little at a time. When filing, always file in a downward motion to prevent chipping the top of the laminate. File the edges until they are free from any sharp points or shards.

Step 6 – Sand until Smooth

The final step in trimming the laminate countertops is to smooth the edges. You can use the sandpaper for this task. Rub the filed edges slowly and easily to create a buffed and smooth surface along the entire cut edge. Again, apply the sandpaper in a downward direction just as with the file to prevent chipping or sanding of the laminate. Once you have completed the sanding and the laminate is smooth, you can remove any tape that is on the laminate countertop.

Self-check #4	Written test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How to trim a laminate countertop?5pts

Note: **Satisfactory rating - 3 and 5 points** **Unsatisfactory - below 3 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Operation Sheet 1	Laminate preparation

Methods of cutting laminates

M1-Step1-:-Make Straight Cuts

1. Use a circular saw or a handsaw with at least 18 teeth per inch to avoid chipping it.
2. Mark the line on the laminate flooring. ...
3. Leave the laminate facing right-side-up and cut it with a circular saw or handsaw.

M2- step 1- Cut Curved Shapes

1. Choose a jigsaw with a standard blade or one with a laminate flooring jigsaw blade with fine teeth. The fine teeth will allow you to cut the laminate flooring face up without chipping it.
2. Make a paper pattern to help you make curved cuts and avoid wasting laminate flooring.
    - Hold a piece of paper around the pillar or pipes and trace around the objects.
    - Cut out the paper pattern, and then lay it back down to test for accuracy.

Instruction Sheet	LG18: Finalize operation and clean up

This learning guide is developed to provide you the necessary information regarding the following content coverage and topic -

- Workplace procedures for clearing
- Maintaining and storing of tools & equipment's
- Tagging and reporting procedures

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Clean; hand and /or power tools and equipment and store in accordance with workplace procedures.
- Clean tools and equipment and left in a safe mode.
- Tagged and report faulty and/or defective equipment is in accordance with work place practices.
- Waste and scrap materials are dealt with following workplace procedures.
- Collect and store Off-cuts and unused materials for reuse or disposal following workplace procedures.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information "Sheet 1, Sheet 2, Sheet 3 and Sheet 4".
4. Accomplish the "Self-check 1, and Self-check t 2, **in page -__, and __**respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1,
6. Do the "LAP test" in page – 56 (if you are ready).

Information Sheet-1	Finalize operation and clean up

1.1. Cleaning, maintaining & storing hand& power tools

Clean Hand Tools

Keep your hand tools in good, clean condition with two sets of rags. One rag should be lint-free to clean or handle precision instruments or components.

The other should be oily to prevent rust and corrosion.

1. **Clean floor jacks**

   Wipe off any oil or grease on the floor jack and check for fluid leaks. If you find any, top up the hydraulic fluid.

   Occasionally, apply a few drops of lubricating oil to the wheels and a few drops to the posts of the safety stands.

2. **Clean electrical power tools**

   Keep power tools clean by brushing off any dust and wiping off excess oil or grease with a clean rag. Inspect any electrical cables for dirt, oil or grease, and for any chafing or exposed wires. With drills, inspect the chuck and lubricate it occasionally with machine oil.

3. **Clean air powered tools**

   Apply a few drops of oil into the inlet of your air tools every day. Although these tools have no motor, they do need regular lubrication of the internal parts to prevent wear.

4. **Clean hoists and heavy machinery;** locate the checklist or maintenance record for each hoist or other major piece of equipment before carrying out cleaning activities. You should clean operating mechanisms and attachments of excess oil or grease.

Information Sheet-2	Tagging and reporting faulty equipment

2.1. Tagging and reporting faulty and/or defective equipment

This procedure applies to all staff, students, contractors and other personnel at workplaces under the management or control of the University of Melbourne.

Authorized person

A person authorized by the local supervisor/manager, who is sufficiently competent to make the plant or equipment safe to use, or confirm that, the plant or equipment has been made safe to use.

Danger tag

A label/sign that identifies that cleaning, servicing, repairing or alteration is being undertaken on isolated installations, plant or equipment.

Out-of-service tag

A label/sign attached to plant or equipment that indicates the plant or equipment is faulty or unsafe to operate and is currently out of service.

PROCEDURE

- **Tagging and removing faulty plant and equipment**

The Head of Department/School must ensure that staff and students have access to suitable resources, including access to out-of-service tags, for implementation of this procedure.

Staff members or students who become aware of plant or equipment which is faulty or unsafe to use must:

- turn off or de-energies plant or equipment, if safe to do so;
- make safe the plant or equipment;
- complete an out-of-service tag, ensuring that the tag describes the:
  - plant or equipment that is out of service;
  - reason the plant or equipment is out of service;
  - if applicable, conditions under which the plant or equipment can be used safely;
  - name of the person completing the tag; and
  - date;
- place the completed out-of-service tag on the plant or equipment at:
  - the point of isolation from the energy source; or
  - the main control panel; or
  - a prominent position;
- notify the supervisor/manager responsible for the plant or equipment; and

- Make arrangements (directly or through the supervisor/manager) for the plant or equipment to be repaired or removed from the work area.

Unless authorized, no person may use plant or equipment that has been tagged with an out-of-service tag, or remove the tag.

➢ **Out-of-service tag**

An out-of-service tag must list the:

- plant or equipment that is out of service;
- reason the plant or equipment is out of service;
- if applicable, conditions under which the plant or equipment can be used safely;
- Name of the person completing the tag; and date.

Sample of out-of-service tag: Advice topics: Out-of-service tags

Note: An out-of-service tag should be distinguished from a danger tag. A danger tag is used during lock-out, tagging and isolation of installations, plant or equipment, for the purposes of cleaning, servicing, repairing or alteration. Danger tags should not be used to identify or remove from service faulty and unsafe plant and equipment.

➢ **Returning to service**

The authorized person returning the plant or equipment into service must:

- review the reason why the plant or equipment was removed from service;
- repair or otherwise make safe the plant or equipment, or confirm that the plant or equipment has been repaired or otherwise made safe;
- document any repair works undertaken and declare that the plant or equipment is safe to return to service; and
- Hand over the plant or equipment to the local supervisor/manager or delegate.

➢ **Removing the tag**

An out-of-service tag may only be removed under the following conditions:

- the authorized person has repaired or otherwise made the plant or equipment safe to use;
- the authorized person has confirmed that the plant or equipment is safe to use; and
- The supervisor/manager, after consulting with the person who initially placed the tag, confirms that the plant is safe to use.

` **LAP Test**	**Practical Demonstration**

`Name:_____ Date: _____

Time Started: _____ Time Finished: _____

***Instructions*:**You are required to perform the following- request the carry out measurement and calculations measurement bill of material cutting list cutting waste & cost calculationthen perform the following task in front of your trainer:

Task1. Prepare the work place

Task2. measure and cutting sheet materials

Task3. Applying the sheet Laminate

Task4. Finish the sheet laminating

1. Request your trainer for an evaluation and feedback.

REFERENCES

- Veneer product information manual (book)
- Preparing and apply decorative wood veneer
- For hand out and manual
- [Architecture E-book] - Wood as an Engineering Material
- BasicWoodworkingText
- The Complete Illustrated Guide To Furniture & Cabinet Construction
- www.osha.gov.